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Antarctic holothuroids from the Bellingshausen Sea, with descriptions of new species (Echinodermata: Holothuroidea)

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Abstract

Three new species of holothuroids from the Antarctic Peninsula and Bellingshausen Sea are described, with O'Loughin & Manjón-Cabeza as authors: dendrochirotids *Cucumaria dudexa* **sp. nov.**, *Psolicrux iuvenilesi* **sp. nov.**; myriotrochid *Myriotrochus hesperides* **sp. nov.** *Parathyonidium incertum* Heding is discussed. Two synonymies for Antarctic holothuroids are formalised: *Caespitugo citriformis* Gutt is a junior synonym of *Thyone scotiae* Vaney; *Caespitugo diversipes* Gutt is a junior synonym of *Cucumaria psolidiformis* Vaney. *Cucumaria armata* Vaney is removed from inclusion in the *Cucumaria georgiana* (Lampert) group, and is a junior synonym of *Cucumaria psolidiformis* Vaney. A synonymy of *Cucumaria aspera* Vaney with *Psolidium (Cucumaria) coatsi* Vaney is rejected; *Cucumaria aspera* Vaney is referred to the *Cucumaria georgiana* (Lampert) group. *Cucumaria conspicua* Vaney is removed from synonymy with *Psolidium (Cucumaria) coatsi* Vaney, and is a junior synonym of *Cucumaria psolidiformis* Vaney. *Thyone scotiae* Vaney is referred to *Crucella* Gutt. *Caespitugo* Gutt is a junior synonym of *Crucella* Gutt. A new genus *Cucamba* O'Loughlin is erected; *Cucumaria psolidiformis* Vaney is referred to *Cucamba* O'Loughlin. A synonymy of *Staurocucumis grandis* (Vaney) with *Staurocucumis turqueti* (Vaney) is confirmed. The referral of *Pseudocolochirus mollis* Ludwig & Heding to *Psolidiella* Mortensen is confirmed. Lists of contemporary synonymies for Antarctic holothuroid species and generic referrals for Antarctic dendrochirotid species are provided. A table of holothuroid species collected from the Antarctic Peninsula and Bellingshausen Sea by the Spanish BENTART–2003 and BENTART–2006 cruises is provided.

Key words: Bentart, Dendrochirotida, Myriotrochidae, new genus, new species, synonymies, generic referrals

Introduction

The University of Málaga currently holds a large collection of holothuroids from the Antarctic Peninsula and Bellingshausen Sea. These were collected by two Spanish Government expeditions, BENTART–2003 (30 January to 27 February 2003) and BENTART–2006 (20 January to 13 February 2006), using the Spanish R/V *Hesperides*. The goal of the BENTART expeditions was an integrated taxonomic and ecological study of the benthos of this Antarctic region.

During October of 2008 this large collection was studied, and the data collated by the authors and their student assistants from the University of Málaga. These data are in Table 1. Seven new species were recognized. Three are described in this work. The remaining four have been found in other Antarctic collections and will be described elsewhere. Mark O'Loughlin is responsible for the systematic decisions in this work. Eugenia Manjón-Cabeza is responsible for the specimens in this collection. Mark O'Loughlin is the author of a new genus, and Mark O'Loughlin and Eugenia Manjón-Cabeza are the authors of the new species. Antarctic echinoids frequently have specimens of species of the holothuroid *Echinopsolus* Gutt attached to the spines. Echinoids from BENTART–2003 and BENTART–2006 were being studied elsewhere when this

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holothuroid collection was being determined, and hence species of *Echinopsolus* Gutt from the Bellingshausen Sea and Antarctic Peninsula are not listed in this work.

In addition to working on the University of Málaga collection of Antarctic holothuroids, during 2008 Mark O'Loughlin has also determined large collections from the Ross Sea (held by the National Institute of Water and Atmospheric Research, NIWA, New Zealand), southern Atlantic (held by Museum Victoria, NMV, Australia), and Prydz Bay region (NMV). The holothuroid types from the Weddell Sea erected by Julian Gutt (1990) have been examined previously. From this work evidence of circum-polar distributions for most Antarctic holothuroid species has emerged. During this study, the opportunity was taken to review synonymies and generic referrals in this work. Contemporary synonymies for Antarctic holothuroid species, and a list of changed generic referrals for Antarctic dendrochirotid species, are listed. In the monograph on family Phyllophoridae by Heding & Panning (1954), Albert Panning erected the genus *Parathyonidium* Heding and species *Parathyonidium incertum* Heding based on the notes of his deceased colleague Svend Heding who had hoped to write a report on the *Discovery* holothuroids. This species was found in the BENTART collections, and is discussed in this work.

Methods

Holotypes and paratypes and most of the specimens are lodged in the National Museum of Natural Sciences, Madrid (Museo Nacional de Ciencias Naturales, MNCN). Permanent slides of ossicles of the type species were prepared in Museum Victoria (NMV) by Mark O'Loughlin, and are registered and lodged in NMV with permission from Eugenia Manjón-Cabeza. Slide registrations numbers are listed with the descriptions below.

Digital photos of specimens were taken in the University of Málaga by Eugenia Manjón-Cabeza using a Nikon digital camera with microscope DXM1200F and Auto-Montage Pro software. Digital images of ossicles were taken in NMV by Chris Rowley, with Mark O'Loughlin, using a Leica DM5000 B compound microscope with Leica DC500 digital camera and Auto-Montage Pro software.

Cucumariidae Blainville

Cucamba O'Loughlin gen. nov.

Diagnosis. Genus of family Cucumariidae with 8 and 2 smaller tentacles; larger tube feet on 5 radii; smaller tube feet scattered on interradii; single-layered perforated plate body wall ossicles.

Type species. *Cucumaria psolidiformis* Vaney, 1908 (monotypic).

Etymology. From *Cuc* (first part of family name), with the Latin *ambo* (two together), referring to the two sizes of tube feet (feminine).

Remarks. In this work *Caespitugo citriformis* Gutt, 1990, the type species for *Caespitugo* Gutt, 1990, is judged to be a junior synonym of *Thyone scotiae* Vaney, 1906. *Thyone scotiae* Vaney is referred to *Crucella* Gutt, 1990. *Caespitugo* Gutt thus becomes a junior synonym of *Crucella* Gutt.

Cucamba psolidiformis (Vaney) syn. nov., comb. nov.

Table 1.

Cucumaria psolidiformis Vaney, 1908: 27–28, pl. 2 figs 17, 18, pl. 4 figs 51–53.—Ekman, 1925: 89–92, fig. 19.—Panning, 1949: 416.—Panning, 1955: 38.—Pawson, 1969: pl. 22 map 2.

Cucumaria conspicua Vaney, 1908: 29, pl. 2 figs 15, 16, pl. 5 fig. 67.—Panning, 1949: 416.—Panning, 1955: 38.—Pawson, 1969: pl. 22 map 2 (new synonym).

Cucumaria armata Vaney, 1908: 31–32, pl. 5 figs 57, 58 (new synonym).

Caespitugo diversipes Gutt, 1990: 102–104, figs 1–4, table 1.—Gutt, 1991: 323–324.—O'Loughin et al., 1994: 549, 555, table 2 (new synonym).

Remarks. *Cucumaria psolidiformis* Vaney, 1908 has a circum-polar distribution (M. O'Loughlin pers. obs.). The distinguishing characters of *Cucumaria psolidiformis* Vaney and *Caespitugo diversipes* Gutt, 1990 are: hard parchment-like body wall; long thin tail; mouth and anus terminal; 10 dendritic tentacles with ventral pair small; distinctive radial tube feet; inconspicuous interradial tube feet; irregular, perforated, elongate, narrow, thick, knobbed, single-layered, body wall ossicles. *Caespitugo diversipes* Gutt, 1990 is judged to be a junior synonym of *Cucumaria psolidiformis* Vaney, 1908. *Cucumaria psolidiformis* Vaney, 1908 is referred to *Cucamba* O'Loughlin gen. nov. that has the diagnostic characters listed above.

O'Loughlin (2002) synonymised *Cucumaria conspicua* Vaney, 1908 with *Psolicrux coatsi* (Vaney, 1908). That synonymy is rejected here, based on a closer reading of the description by Vaney (1908) of the single small type specimen (10 mm long) that includes: large tube feet along the radii, and numerous very small tube feet over the interradii. The only Antarctic holothuroid with this type of tube foot arrangement is *Cucumaria psolidiformis* Vaney, 1908. On this basis *Cucumaria conspicua* Vaney, 1908 is a junior synonym of *Cucumaria psolidiformis* Vaney, 1908.

Ekman (1925) synonymised *Cucumaria armata* Vaney, 1908 with *Cucumaria georgiana* (Lampert, 1886), and *C. armata* has been included in the "*Cucumaria georgiana* (Lampert, 1886) group" created by Gutt (1988) and followed by Massin (1992). *Cucumaria armata* Vaney, 1908 is removed from that synonymy in this work. It is judged in this work to be a junior synonym of *Cucumaria psolidiformis* Vaney, 1908, based on the following characters described by Vaney (1908): large numbers of small, close dorso-lateral tube feet; large, thick, irregular, often narrow, knobbed perforated plates (characteristic of *C. psolidiformis*).

***Cucumaria dudexa* O'Loughin & Manjón-Cabeza sp. nov.**
Figure 1a–c; table 1.

Material examined. Holotype. East Bellingshausen Sea, R/V *Hesperides*, BENTART–2003, stn MB13B, 69.8223ºS, 77.8320ºW, 605 m, 15 Feb 2003, MNCN 29.04/125; tentacle ossicles slide NMV F161512; dorsal body ossicles slide F161513; ventral body ossicles slide F161514; dorsal body ossicles slide F161515.

Diagnosis. Specimen 35 mm long (tentacles withdrawn, preserved), sub-cylindrical, widest diameter 6 mm; thin, flexible, calcareous, parchment-like body wall; distinct sole ventrally, slight "belly"; upturned oral cone, rounded distally, 2 soft dorso-lateral oral papillae, 0.6 mm long; upturned long tapered anal cone, 18 mm long, thin and rounded distally, 5 soft radial anal papillae 0.6 mm long; 10 dendritic tentacles, ventral pair small; tube feet confined to radii, well-developed close paired series bordering sole latero-ventrally, slightly more spread series mid-ventrally, ventral interradii bare, smaller sparse radial tube feet on oral and anal cones; calcareous ring with 10 plates; radial plates anteriorly digitiform, thin, wide posteriorly with triangular notch; interradial plates anteriorly elongate, thin, tapered, wide posteriorly with curved indentation.

Ossicles in body wall slightly imbricate plates; ossicles single-layered, irregular, predominantly elongate, thick, smooth, perforated plates, few up to 24 large to small perforations, lacking surface and marginal knobs and spines, up to 400 μm long; similar dorsally and ventrally; rare plates with digitiform denticulation and small perforations at one end. Tube feet with small endplates, 176 μm diameter, small perforations centrally, marginally denticulate perforated support plates, not rods, up to 176 μm long. Tentacles ossicles thick to thin, curved to bent to concave, round to oval, perforated plates, not rods, plates with blunt marginal denticulations, lacking surface knobs and spines, plates up to 208 μm long.

Colour (preserved). Off-white.

Distribution. Antarctica, east Bellingshausen Sea, 605 m.

Etymology. From the Greek *dudexa* (twelve), to honour the Manjón-Cabeza family to whom this number is richly significant.

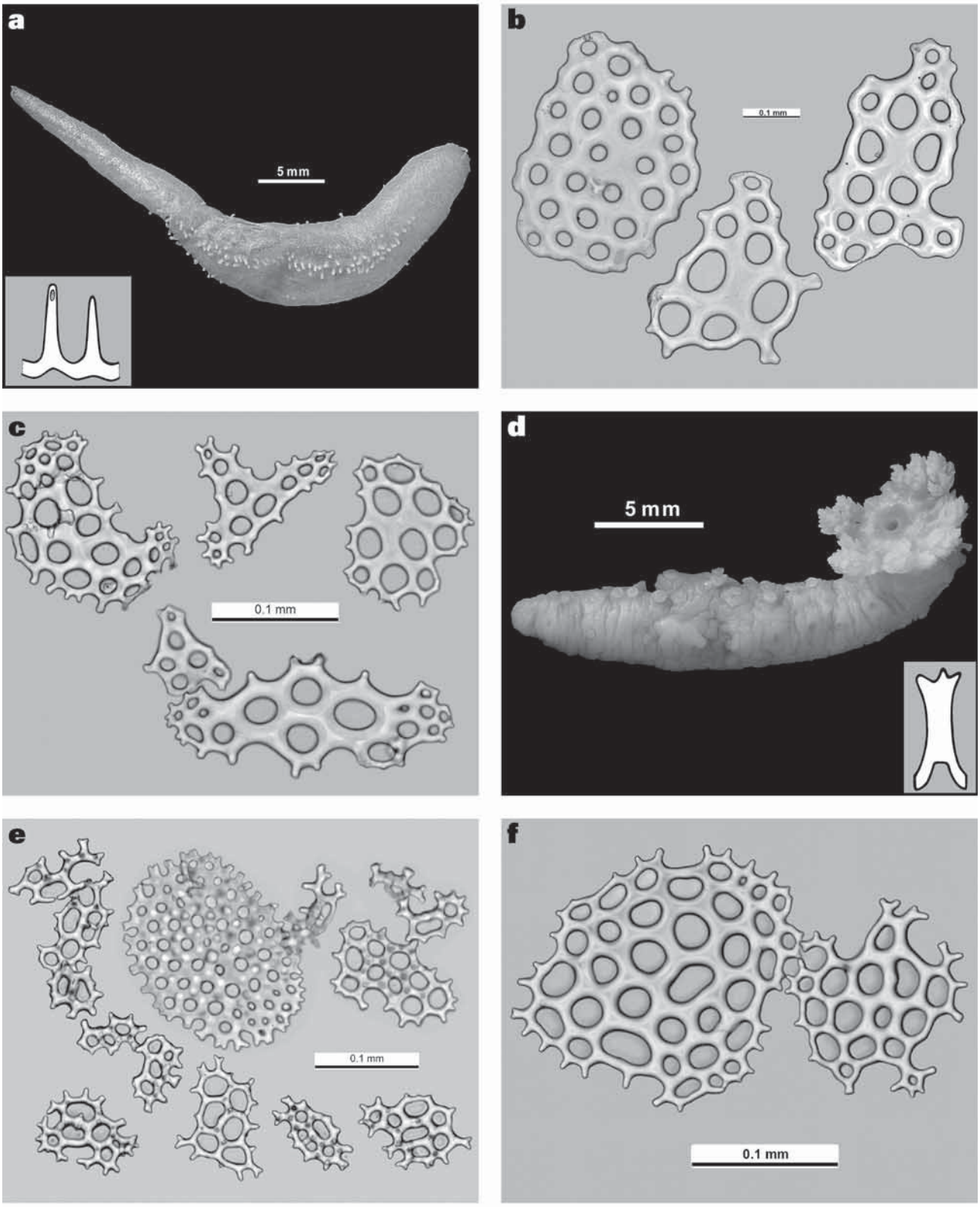

FIGURE 1. a–c, *Cucumaria dudexa* O'Loughin & Manjón-Cabeza **sp. nov.**: a, holotype (MNCN 29.04/125), lateral view, oral end right, radial (left) and interradial plates of calcareous ring (insert); b, body wall ossicles (slides NMV F161513, F161514); c, tentacle ossicles (slide F161512). d–f, *Parathyonidium incertum* Heding, 1954: d, lateral view, radial plate of calcareous ring (insert) (MNCN 29.04/126); e, body wall ossicles (slide F161525); f, tentacle ossicles (slide F121567 from MNCN 29.04/127).

Remarks. This new Antarctic dendrochirotid species is referred to *Cucumaria* Blainville because it has: 10 dendritic tentacles, ventral pair smaller; tube feet confined to radii; calcareous ring lacking posterior composite projections, ring plates with narrowing anterior projection and posterior indentation; body wall ossicles single-layered perforated plates. Antarctic *Cucumaria* species described to date have been grouped by Gutt (1988) and Massin (1992) into the "*Cucumaria georgiana* (Lampert, 1886) group". *Cucumaria dudexa* O'Loughin & Manjón-Cabeza **sp. nov.** shares with this group the combination of eight large and two small tentacles, radial tube foot distribution, and single-layered perforated plates in the body wall. *Cucumaria dudexa* O'Loughin & Manjón-Cabeza **sp. nov.** is distinguished from this group of species by the distinctive long thin tapered anal cone, presence of a discrete sole, and absence of knobs and spines on the perforated plate ossicles. Only a single specimen of *Cucumaria dudexa* **sp. nov.** was collected, but it is in very good condition and has distinct diagnostic characters.

***Parathyonidium incertum* Heding**
Figure 1d–f; table 1.

Parathyonidium incertum Heding (in Heding & Panning, 1954): 37–39, fig. 3.

Material examined. Antarctic Peninsula, Low I., BENTART–2006, R/V *Hesperides*, stn LOW47, 63.4668ºS, 62.2151ºW, 115 m, 12 Feb 2006, MNCN 29.04/126 (1 specimen), body wall ossicles slide NMV F161525; MNCN 29.04/127 (2 specimens), posterior body ossicles slide F161526, tentacle ossicles slide F161527; South Atlantic Ocean, South Georgia, *Icefish* 2004, stn 47 BT25, 114–118 m, 12 Jun 2004, NMV F104998 (1).

Diagnosis. Specimens up to 35 mm long (tentacles partly extended, preserved, NMV F104998), sub-cylindrical, elongate, widest diameter 5 mm; soft thick non-calcareous body wall; lacking distinct sole ventrally; oral end sometimes upright, slightly tapered and rounded distally when tentacles withdrawn; anal end slightly tapered and rounded distally; 15 dendritic tentacles (variable; "type" has 13; F104998 has 16), unequal, some undeveloped (buds only); long digitiform genital papilla posterior to dorsal tentacle pair in male specimen (indicative of internal fertilization and brood protection); tube feet confined to radii, spaced single series of large tube feet, uniform in size from base of tentacles to anus; calcareous ring faintly evident, only radial plates evident, wide anteriorly and posteriorly, narrowed in mid-plate, 2 small notches anteriorly, deep rounded notch posteriorly.

Ossicles in body wall abundant, thin, bluntly spinous to smooth, single-layered irregular plates, few to many perforations; similar dorsally and ventrally; common form elongate, with 2 large central perforations, 2 small distal perforations, one extended end with few small perforations, short blunt spines on surface and around margin, typically 100 μm long; small plates intergrade with larger smooth to knobbed, marginally denticulate plates, up to 200 μm long. Tube foot endplates large, up to 360 μm diameter, few perforated support plates, not rods. Tentacles ossicles perforated plates, not rods, round to oval, slightly concave, blunt marginal denticulations, some with central knob, some fine surface knobs, plates up to 200 μm long.

Colour. Live: semi-translucent pale brown. Preserved: pale grey.

Distribution. South Georgia, Antarctic Peninsula (Low I.), 114–199 m.

Remarks. In Heding & Panning (1954, p. 37) Panning notes that Heding died before their MS was completed, and before Heding was able to work on a *Discovery* Report. Panning wrote that he erected the new genus *Parathyonidium* Heding, 1954 and new species *Parathyonidium incertum* Heding, 1954 based on the notes by Heding, and with the approval of Dr. Deichmann (Harvard University). The specimens (obviously more than one) for this new genus and species were from *Discovery*-Expedition Stat. 474, one sea mile west of Shag Rock, South Georgia, 199 m. No registration numbers are recorded, or precise number of specimens, but a "Type" is referred to. The descriptions are diagnostic and accord closely with the description above, except that no measurements were given for specimens or ossicles. Panning wrote that the work on the

Discovery material was taken over by Dr. Deichmann. This was not completed, and no *Discovery* Report has been published. All of the *Discovery* holothuroids that remained on loan to the Smithsonian US National Museum of Natural History are currently (December 2008) in Museum Victoria for determination, on their way back to the British Museum of Natural History. The types for *Parathyonidium incertum* Heding, 1954 are not with the *Discovery* lots currently in Museum Victoria. It is reported (David Pawson, pers. comm.) that a paratype from Elephant Island is in the Paris Museum. The holotype has not been located.

***Psolicrux coatsi* (Vaney, 1908)**
Figure 2d; table 1.

Remarks. Ekman (1925) synonymised *Cucumaria aspera* Vaney, 1908 with *Psolidium (Cucumaria) coatsi* Vaney, 1908. This synonymy was not recognized in the *Psolicrux coatsi* (Vaney, 1908) synonymy in O'Loughlin (2002). That omission is supported in this work. The small type specimen (11 mm long) of *Cucumaria aspera* Vaney, 1908 belongs as an additional species in the "*Cucumaria georgiana* (Lampert, 1886) group" created by Gutt (1988) and adopted by Massin (1992), based on the following characters described by Vaney (1908): tube feet confined to radial series; eight and two small ventral tentacles; irregular perforated plate ossicles, with some knobs.

Cucumaria conspicua Vaney, 1908 is removed from the *Psolidium (Cucumaria) coatsi* Vaney, 1908 synonymy by O'Loughlin (2002), and referred above to *Cucamba psolidiformis* (Vaney, 1908).

***Psolicrux iuvenilesi* O'Loughin & Manjón-Cabeza sp. nov.**
Figure 2a–c; table 1.

Material examined. Holotype. Antarctic Peninsula, Gerlache Strait, BENTART–2003, R/V *Hesperides*, stn PA23, 64.9255ºS, 63.6068ºW, 656 m, 25 Feb 2003, MNCN 29.04/128; dorsal body ossicles slide NMV F161522; ventral body ossicles slide F161523; tentacle ossicles slide F161524.

Paratypes. Type locality and date, MNCN 29.04/129 (4).

Other material. Paraiso Bay, R/V *Hesperides*, stn BP21, 64.90ºS, 63.01ºW, 101 m, 23 Feb 2003. Eastern Antarctica, Prydz Bay, Fram Bank, 444–453 m, 26 Feb 1991, F68053 (1); Enderby Land, 386–400, 15 Nov 1985, F84985 (1).

Diagnosis. Specimens up to 29 mm long (tentacles withdrawn), widest diameter 11 mm; thin, flexible, calcareous, body wall with minute projecting spines; distinct sole and "belly" ventrally; oral cone, tapered anal cone forming distinct "tail", both oral and anal cones frequently upturned; 10 subequal dendritic tentacles; large tube feet in mid-ventral and latero-ventral paired radial series defining a distinct sole with broad bare interradii; single latero-ventral row (of the paired series) bordering the bare interradii typically close, outer row of paired series more spaced; smaller tube feet scattered dorsally and laterally and on oral and anal cones; tube feet do not cross introvert; radial plates of calcareous ring elongate, sub-rectangular, with deep posterior notch; interradial plates elongate, tapered and rounded anteriorly, with shallow rounded indentation posteriorly.

Ossicles in body wall numerous, imbricate, large, thick, single-layered, perforated, smooth plates with angled narrow distally spinous spire, plate and spire up to 480 μm long, spires typically 160 μm long; plates irregular in size and form; spired plates similar dorsally and ventrally; lacking small branched bluntly spinous rods and crosses. Largest tentacle ossicles irregularly oval to elongate, thick, knobbed, curved, perforated plates, up to 640 μm long; smallest plates thin, smooth, marginally bluntly denticulate.

Colour (preserved). Pale grey-brown.

Distribution. Western Antarctica (Gerlache Strait), Eastern Antarctica (Fram Bank); 101-656 m.

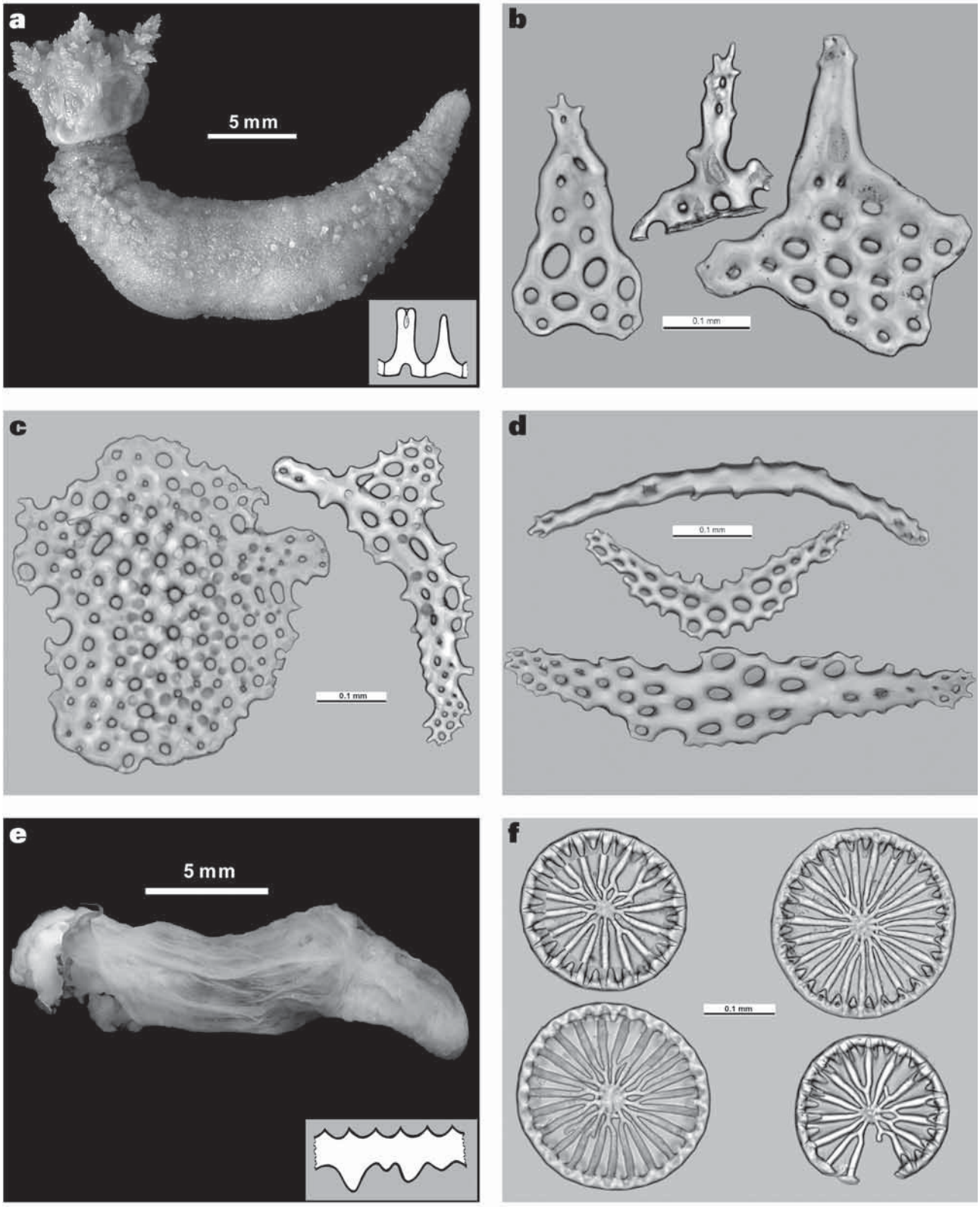

FIGURE 2. a–c, *Psolicrux iuvenilesi* O'Loughin & Manjón-Cabeza **sp. nov.**: a, holotype (MNCN 20.04/128), lateral view, radial (left) and interradial plates of the calcareous ring (insert); b, spired plates (slide F161523 from holotype) and spire from body wall (slide from specimen F68053); c, tentacle ossicles (slide from specimen F68053).d, *Psolicrux coatsi* (Vaney, 1908): tentacle ossicles (slide from specimen F160026).e, f, *Myriotrochus hesperides* O'Loughin & Manjón-Cabeza **sp. nov.**: e, holotype (MNCN 29.04/130), oral end with calcareous ring left, asymmetrical plates of calcareous ring (insert); f, wheels from posterior dorsal body wall (slide F161516).

Etymology. From the Latin *iuveniles* (young people) in recognition of the skilled assistance provided by the young University of Málaga students Blanca Gallego Tevar, Carolina Yuste Florido and Juan Miguel Pérez Ramos.

Remarks. O'Loughlin (2002) reviewed *Psolidium (Cucumaria) coatsi* Vaney, 1908, erected the new genus *Psolicrux* for the species, and judged that *Cucumaria conspicua* Vaney, 1908, *Psolidium navicula* Ekman, 1927 and *Psolidium bistriatum* Ludwig & Heding, 1935 were junior synonyms. *Cucumaria conspicua* Vaney, 1908 is removed above from the synonymy by O'Loughlin (2002), and referred to *Cucamba psolidiformis* (Vaney, 1908).

Body form, knobbed cross ossicles and spired plate ossicles of *Psolicrux coatsi* (Vaney, 1908) were illustrated by O'Loughlin (2002, figs 3c–f). In examining the material for that work it was noted that knobbed crosses were sometimes not found, and this was judged to be a sampling artefact (O'Loughlin, pers. obs.). In this work there has been a consistent absence of knobbed crosses in some specimens. The specimens lacking knobbed crosses are referred to the new species *Psolicrux iuvenilesi* O'Loughin & Manjón-Cabeza **sp. nov.** In addition to the absence of knobbed crosses, the specimens are smaller, and the largest tentacle ossicles are thick knobbed oval to elongate plates while in *Psolicrux coatsi* (Vaney) the largest tentacle ossicles are thick, narrow, bluntly spinous, perforated rods, up to 536 μm long (Figure 2d).

***Psolidiella mollis* (Ludwig & Heding)**

Table 1.

Pseudocholochirus mollis Ludwig & Heding, 1935: 204–209, figs 62–65.—O'Loughlin, 2000: 25.
Psolidiella mollis.—Panning, 1949: 415.—Pawson, 1969: 37, pl. 22 map 1.—Pawson, 1970: 36.—Gutt, 1988: 22.—Gutt, 1991: 323, 324.

Remarks. Panning (1949) referred *Pseudocolochirus mollis* Ludwig & Heding, 1935 to *Psolidiella* Mortensen, 1925a. In a subsequent treatment Panning (1971) did not include *P. mollis* in *Psolidiella*, but did not reassign the species. O'Loughlin (2000) reviewed *Psolidiella* and, being unfamiliar with *P. mollis*, followed Panning (1971) and omitted *P. mollis* from *Psolidiella*. Current familiarity with the species confirms the original referral by Panning (1949) of *Pseudocolochirus mollis* Ludwig & Heding, 1935 to *Psolidiella* Mortensen, 1925a.

***Staurocucumis turqueti* (Vaney)**

Cucumaria grandis Vaney, 1906b: 405.—Vaney, 1906c: 12–14.—Vaney, 1908: 24–25, pl. 4, figs 45, 46.—Vaney, 1914: 9–11, pl. 2, fig. 10.—Cherbonnier, 1941: 571–573.
Cucumaria turqueti Vaney, 1906b: 406.— Vaney, 1906c: 18–19, fig. 1.—Ekman, 1925: 45–49, fig. 8.—Cherbonnier, 1941: 571–573.
Staurocucumis turqueti.— Ekman, 1927: 381–384, fig. 9.—Hansen, 1988: 303, 304, fig. 2.—Massin, 1994: 130, 132, fig. 2.
Cucumaria spatha Cherbonnier, 1941: 571–573.
Ekmocucumis turqueti.—Heding, 1942: 33.—Panning, 1949: 453.—Pawson, 1969: pl. 22 map 4.—Gutt, 1991: 323, 324.
Ekmocucumis spatha.—Panning, 1949: 453.—Pawson, 1969: pl. 22 map 4.—Cherbonnier, 1974: 602.
Ekmocucumis grandis.—Cherbonnier, 1974: 602.
Abyssocucumis turqueti.—Gutt, 1988: 22.
Ekmocucumis sp. MoV 2085.—O'Loughlin et al., 1994: 551, 555, table 2.

Remarks. Ekman (1925) made *Cucumaria grandis* Vaney, 1906b a junior synonym of *Cucumaria turqueti* Vaney, 1906b, although *C. grandis* has page precedence in Vaney (1906b). Since Ekman (1925) was the first reviser the synonymy is valid. Cherbonnier (1941) retained *Cucumaria grandis* Vaney but replaced the name

with *Cucumaria spatha*, judging incorrectly that Vaney (1906b) used an invalid name. The original synonymy by Ekman (1925) is confirmed here.

Myriotrochidae Théel

***Myriotrochus hesperides* O'Loughin & Manjón-Cabeza sp. nov.**
Figure 2e, f: table 1.

Material studied. Holotype. Antarctic Peninsula, BENTART–2006, R/V *Hesperides*, stn PA41, 65.47149ºS, 69.0285ºW, 350 m, 10 Feb 2006, MNCN 29.04/130; posterior dorsal body ossicles slide NMV F161516.

Diagnosis. Specimen 13 mm long; thin translucent body wall; sub-cylindrical, dorsal oral ring projecting anteriorly over ventral, body rounded distally; 12 peltato-digitate tentacles, each tentacle with about 7 small rounded digits; plates of calcareous ring asymmetrical, with short pointed anterior projections, wide rounded tongue-like posterior projections of variable length, 2 radial plates each with 2 anterior projections.

Tentacles lacking ossicles; body wall ossicles a few wheels only in the posterior dorsal body wall; wheels of one type, with teeth all pointing towards centre of hub; spokes irregular, about half branching proximally, some branches not reaching rim, some spokes with cross-connections; teeth variably sub-equal or different in size; hubs small, irregular, not disc-like, lacking perforations, formed by junction of spokes; largest wheel with diameter 248 μm, hub diameter 40 μm, 13 spokes at hub, 23 spokes at rim, 30 equal teeth; smallest wheel with diameter 200 μm, hub diameter 24 μm, 12 spokes at hub, 16 spokes at rim, 28 unequal teeth.

Colour (preserved). Off-white, translucent; tentacle digit ends reddish-brown.

Distribution. Antarctic Peninsula, 350 m.

Etymology. Named, as a noun in apposition, for the Spanish R/V *Hesperides* used for BENTART–2003 and BENTART–2006.

Remarks. Based on the key to the genera of family Myriotrochidae in Gage & Billett (1986), this new myriotrochid species is referred to *Myriotrochus* Steenstrup because it has: 12 tentacles; asymmetrical calcareous ring, with 2 radial plates each with 2 anterior projections; absence of rod ossicles; wheel hubs lacking perforations; wheel ossicles of one type only, with all teeth pointed towards centre of hub.

Three specimens of myriotrochid holothuroid have been taken in Antarctica. Smirnov and Bardsley (1997) described *Myriotrochus antarcticus* from a 2 mm long specimen from the MacRobertson Shelf in eastern Antarctica at 113 m. The wheels are 140–150 μm in diameter, have 22–24 teeth, and 15–16 unbranched spokes, different to *Myriotrochus hesperides* O'Loughin & Manjón-Cabeza **sp. nov.** A New Zealand National Institute of Water and Atmospheric Research (NIWA) single specimen of a *Myriotrochus* species (registration NIWA 37812, two pieces, combined length 33 mm) was taken in the Ross Sea at 2283 m in 2008. The wheel diameters are 320–395 μm, have about 30 teeth, have 11–15 unbranched spokes and a perforated spoked hub, also different to *Myriotrochus hesperides* O'Loughin & Manjón-Cabeza **sp. nov.** that is characterised by wheels with a small unperforated hub and frequently proximally branched spokes. The single type specimen is damaged, but appears to be intact, and has a complete oral end.

Myriotrochus hesperides O'Loughin & Manjón-Cabeza **sp. nov.** has some characters that are similar to *Myriotrochus clarki* Gage & Billett, 1986 from the Rockall Trough in the NE Atlantic at 1605–2515 m. Both species have large tongue-like posterior projections on the calcareous ring, but these are larger in *M. hesperides* and the anterior projections smaller. An "abnormal" wheel with a few distally branched spokes is illustrated for *M. clarki*, but all the *M. hesperides* wheels have numerous proximally branched spokes.

Paracucumidae Pawson & Fell

Crucella scotiae **(Vaney) syn. nov., comb. nov.**
Table 1.

Thyone scotiae Vaney, 1906a: 400-401, fig. 1.—Ekman 1925: 106–108, fig. 24.
Ypsilocucumis scotiae.—Panning, 1949: 455.—Pawson, 1969: map 3.
Caespitugo citriformis Gutt, 1990: 105, figs 1, 5–7, table 2.—Gutt, 1991: 324 (new synonym).
Crucella cf. *hystrix* Gutt, 1990.—O'Loughlin et al., 1994: 552, table 2.

Remarks. *Thyone scotiae* Vaney, 1906a has a circum-polar distribution (M. O'Loughlin, pers. obs.). The distinguishing characters of *Thyone scotiae* Vaney, 1906a and *Caespitugo citriformis* Gutt, 1990 are: body with narrowed tail; hard to parchment-like body wall; 10 tentacles with ventral pair small; cucumariid not phyllophorid calcareous ring; tube feet evenly distributed around body; body wall ossicles small knobbed plates, large irregular thick knobbed perforated plates with central secondary mesh thickening; posterior body with multi-layered ossicles. *Caespitugo citriformis* Gutt, 1990 is judged here to be a junior synonym of *Thyone scotiae* Vaney, 1906a. *Thyone* Oken is an inappropriate genus for *Thyone scotiae* Vaney, since the calcareous rings of *Thyone* species have elongate composite posterior projections characteristic of family Phyllophoridae. Panning (1949) inappropriately referred *T. scotiae* to his new genus *Ypsilothuria*, diagnosed as having 10 equal tentacles. *Thyone scotiae* Vaney is referred here to *Crucella* Gutt, 1990 that has: body with narrowed tail; hard to parchment-like body wall; 10 tentacles with ventral pair small; cucumariid not phyllophorid calcareous ring; tube feet evenly distributed around body; body wall ossicles crosses with four perforated arms, with or without central secondary mesh thickening and spine. Gutt (1990) referred his now junior synonym species *C. citriformis* to his genus *Caespitugo*, but it is judged here that the senior synonym *T. scotiae* is more appropriately referred to *Crucella* Gutt, 1990 because of the multi-layering in the centre of some perforated plates, and some plates cross-shaped or with irregular arms. *Caespitugo* Gutt, 1990 becomes a junior synonym of *Crucella* Gutt, 1990.

Contemporary synonymies for Antarctic holothuroid species (since 1994)

Achlyonice violaecuspidata Gutt, 1990 = *Rhipidothuria racowitzai* Hérouard, 1901 (by Gebruk & Shirshov, 1994)
Bathyplotes fuscivinculum Gutt, 1990 = *Bathyplotes bongraini* Vaney, 1914 (by O'Loughlin, 2002)
Bathyplotes rubipunctatus Gutt, 1990 = *Bathyplotes gourdoni* (Vaney, 1914) (by O'Loughlin, 2002)
Caespitugo citriformis Gutt, 1990 = *Thyone scotiae* Vaney, 1906a (this work)
Caespitugo diversipes Gutt, 1990 = *Cucumaria psolidiformis* Vaney, 1908 (this work)
Cucumaria armata Vaney, 1908 = *Cucumaria psolidiformis* Vaney, 1908 (this work)
Cucumaria aspera Vaney, 1908 = *Cucumaria georgiana* (Lampert, 1886) group (this work)
Cucumaria conspicua Vaney, 1908 = *Cucumaria psolidiformis* Vaney, 1908 (this work)
Cucumaria grandis Vaney, 1906b = *Cucumaria turqueti* Vaney, 1906b (by Ekman, 1925; confirmed this work)
Cucumaria mira Ludwig & Heding, 1935 = *Cucumaria liouvillei* Vaney, 1914 (by O'Loughln, 2002)
Paracucumis antarctica Mortensen, 1925b = *Thyone turricata* Vaney, 1906a (by O'Loughlin, 2002)
Psolidium navicula Ekman, 1927 = *Psolidium bistriatum* Ludwig & Heding, 1935 = *Psolidium (Cucumaria) coatsi* Vaney, 1908 (by O'Loughlin, 2002)

TABLE 1. List of holothuroids from BENTART-2003 (30 January to 27 February 2003) and BENTART-2006 (20 January to 13 February, 2006).

Taxon	Station	Location	Latitude °S	Longitude °W	Depth m
Apodida Brandt					
Myriotrochus hesperides sp. nov.	PA41A	Antarctic Peninsula	-65.47	-69.03	350
Paradota weddellensis Gutt, 1990	LOW46	Low Island	-63.44	-62.24	97
	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB33	Bellingshausen Sea	-70.29	-84.28	430
	MB9	Bellingshausen Sea	-70.24	-81.77	540
	PA18	Marguerite Bay	-67.96	-71.06	357
	PA23	Gerlache Strait	-64.93	-63.61	656
	PA24	Gerlache Strait	-64.33	-61.97	1054
	PA25	Gerlache Strait	-63.88	-61.81	115
	PA39	Antarctic Peninsula	-68.13	-69.59	167
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
	PA41A	Antarctic Peninsula	-65.47	-69.03	350
	PI28	Peter I Island	-68.87	-90.30	1191
	PI5	Peter I Island	-68.94	-90.59	124
	PI6B	Peter I Island	-68.84	-90.82	218
	PI7	Peter I Island	-68.70	-90.69	375
Aspidochirotida Grube					
Bathyplotes bongraini Vaney, 1914	PA18	Marguerite Bay	-67.96	-71.06	357
	PA23	Gerlache Strait	-64.93	-63.61	656
	PA39	Antarctic Peninsula	-68.13	-69.59	167
	PA39-2	Antarctic Peninsula	-68.13	-69.59	159
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
	PA41A	Antarctic Peninsula	-65.47	-69.03	350
	PA43	Antarctic Peninsula	-63.36	-64.29	254
	PI27	Peter I Island	-69.00	-90.43	1873
Bathyplotes gourdoni (Vaney, 1914)	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB34	Bellingshausen Sea	-70.12	-84.87	603
	PA18	Marguerite Bay	-67.96	-71.06	357
	PI8	Peter I Island	-68.83	-90.35	86
Bathyplotes moseleyi (Théel, 1886)	PA19	Marguerite Bay	-68.07	-78.95	513
	PA23	Gerlache Strait	-64.93	-63.61	656
Bathyplotes sp. 1 undescribed	MB34B	Bellingshausen Sea	-70.12	-84.87	603
Bathyplotes sp. 2 undescribed	PA41A	Antarctic Peninsula	-65.47	-69.03	350
Mesothuria bifurcata Hérouard, 1901	MA4	Amundsen Sea	-70.87	-98.44	427
	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB2	Thurston Island	-70.49	-95.24	722
	MB26	Bellingshausen Sea	-70.24	-95.03	1958
	MB31	Bellingshausen Sea	-69.96	-86.40	1407
	MB33	Bellingshausen Sea	-70.29	-84.28	430
	MB36	Bellingshausen Sea	-69.93	-80.41	559
	MB9	Bellingshausen Sea	-70.24	-81.77	540
Dendrochirotida Grube					
Cucamba psolidiformis (Vaney, 1908)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
	PA39-2	Antarctic Peninsula	-68.13	-69.59	159
	PI6B	Peter I Island	-68.84	-90.82	218

Dendrochirotida Grube (continued)					
Crucella hystrix Gutt, 1990	MB34B	Bellingshausen Sea	-70.12	-84.87	603
Crucella scotiae (Vaney, 1906)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW44	Low Island	-63.43	-62.20	82
	LOW45	Low Island	-63.43	-62.21	86
	LOW46	Low Island	-63.44	-62.24	97
Cucumaria attenuata Vaney, 1906	LOW44	Low Island	-63.43	-62.20	82
	LOW45	Low Island	-63.43	-62.21	86
	LOW46	Low Island	-63.44	-62.24	97
	LOW47	Low Island	-63.47	-62.22	115
	PI5	Peter I Island	-68.94	-90.59	124
	PI6B	Peter I Island	-68.84	-90.82	218
Cucumaria dudexa sp. nov.	MB13B	Bellingshausen Sea	-69.82	-77.83	605
Heterocucumis denticulata (Ekman, 1927)	LOW44	Low Island	-63.43	-62.20	82
	LOW45	Low Island	-63.43	-62.21	86
	LOW46	Low Island	-63.44	-62.24	97
	LOW47	Low Island	-63.47	-62.22	115
	PI6B	Peter I Island	-68.84	-90.82	218
Heterocucumis steineni (Ludwig, 1898)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
	PA20	Gerlache Strait	-65.02	-63.42	48
	PA39-2	Antarctic Peninsula	-68.13	-69.59	159
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
Paracucumis turricata (Vaney, 1906)	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB14B	Bellingshausen Sea	-69.35	-78.09	497
	MB36	Bellingshausen Sea	-69.93	-80.41	559
	PA18	Marguerite Bay	-67.96	-71.06	357
	PA25	Gerlache Strait	-63.88	-61.81	115
Parathyonidium incertum Heding, 1954	LOW47	Low Island	-63.47	-62.22	115
Psolicrux coatsi (Vaney, 1908)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
	PA20	Gerlache Strait	-65.02	-63.42	48
	PA23	Paraiso Bay	-64.90	-63.01	101
Psolicrux iuvenilesi sp. nov	BP21	Paraiso Bay	-64.90	-63.01	101
	PA23	Gerlache Strait	-64.93	-63.61	656
Psolidiella mollis (Ludwig & Heding, 1935)	LOW47	Low Island	-63.47	-62.22	115
Psolidium gaini Vaney, 1914	LOW46	Low Island	-63.44	-62.24	97
Psolidium pawsoni O'Loughlin & Ahearn, 2008	MB2	Thurston Island	-70.49	-95.24	722
	MB3	Thurston Island	-70.29	-95.20	1435
	MB34	Bellingshausen Sea	-70.12	-84.87	603
	MB37	Bellingshausen Sea	-69.43	-80.41	508
	PA23	Gerlache Strait	-64.93	-63.61	656
	PA39	Antarctic Peninsula	-68.13	-69.59	167
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
Psolidium tenue Mortensen, 1925	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB3	Thurston Island	-70.29	-95.20	1435
	MB33	Bellingshausen Sea	-70.29	-84.28	430
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
	PA41A	Antarctic Peninsula	-65.47	-69.03	350
Psolidium whittakeri O'Loughlin & Ahearn, 2008	MB3	Thurston Island	-70.29	-95.20	1435
	PI28	Peter I Island	-68.87	-90.30	1191
Psolus antarcticus (Philippi, 1857)	MB31	Bellingshausen Sea	-69.96	-86.40	1407
	MB35	Bellingshausen Sea	-69.93	-85.16	1132
	PI28	Peter I Island	-68.87	-90.30	1191

Dendrochirotida Grube (continued)					
Psolus chacoti Vaney, 1906	LOW45	Low Island	-63.43	-62.21	86
	LOW46	Low Island	-63.44	-62.24	97
	LOW47	Low Island	-63.47	-62.22	115
	PA39-2	Antarctic Peninsula	-68.13	-69.59	159
Psolus dubiosus Ludwig & Heding, 1935	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
Psolus koehleri Vaney, 1914	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
	PA19	Marguerite Bay	-68.07	-78.95	513
	PA23	Gerlache Strait	-64.93	-63.61	656
Psolus sp. undescribed	PI28	Peter I Island	-68.87	-90.30	1191
Staurocucumis liouvillei (Vaney, 1914)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW47	Low Island	-63.47	-62.22	115
	PA18	Marguerite Bay	-67.96	-71.06	357
	PA20	Gerlache Strait	-65.02	-63.42	48
	PA39-2	Antarctic Peninsula	-68.13	-69.59	159
	PA40A	Antarctic Peninsula	-66.96	-72.58	402
	PA41A	Antarctic Peninsula	-65.47	-69.03	350
	PI5	Peter I Island	-68.94	-90.59	124
	PI6B	Peter I Island	-68.84	-90.82	218
	PI8	Peter I Island	-68.83	-90.35	86
Trachythyone bouvetensis (Ludwig & Heading, 1935)	BP21	Paraiso Bay	-64.90	-63.01	101
	LOW45	Low Island	-63.43	-62.21	86
	LOW47	Low Island	-63.47	-62.22	115
	PI5	Peter I Island	-68.94	-90.59	124
Elasipodida Théel					
Benthodytes sanguinolenta Théel, 1882	MB29	Bellingshausen Sea	-69.40	-88.34	3310
Elpidia glacialis Théel, 1876	MB9	Bellingshausen Sea	-70.24	-81.77	540
Peniagone incerta (Théel, 1882)	MB29	Bellingshausen Sea	-69.40	-88.34	3310
Peniagone vignoni Hérouard, 1901	MA4	Amundsen Sea	-70.87	-98.44	427
	MB10B	Bellingshausen Sea	-70.74	-81.47	497
	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB14B	Bellingshausen Sea	-69.35	-78.09	497
	MB33	Bellingshausen Sea	-70.29	-84.28	430
	MB36	Bellingshausen Sea	-69.93	-80.41	559
	MB37	Bellingshausen Sea	-69.43	-80.41	508
	MB9	Bellingshausen Sea	-70.24	-81.77	540
	PA19	Marguerite Bay	-68.07	-78.95	513
	PA24	Gerlache Strait	-64.33	-61.97	1054
Protelpidia murrayi (Théel, 1879)	MB13B	Bellingshausen Sea	-69.82	-77.83	605
	MB9	Bellingshausen Sea	-70.24	-81.77	540
	PA19	Marguerite Bay	-68.07	-78.95	513
	PA24	Gerlache Strait	-64.33	-61.97	1054
Psychropotes longicauda Théel, 1882	MB29	Bellingshausen Sea	-69.40	-88.34	3310
Molpadida Haeckel					
Molpadia musculus Risso, 1826	MB36	Bellingshausen Sea	-69.93	-80.41	559
	PA19	Marguerite Bay	-68.07	-78.95	513
	PA23	Gerlache Strait	-64.93	-63.61	656
	PA25	Gerlache Strait	-63.88	-61.81	115
Molpadia sp. undescribed	MB36	Bellingshausen Sea	-69.93	-80.41	559

Changed combinations for Antarctic dendrochirotid species

Cucumaria abyssorum Théel, 1886a = *Staurocucumis abyssorum* (Théel, 1886a) (by Ekman, 1927; confirmed by Hansen, 1988)
Cucumaria denticulata Ekman, 1927 = *Heterocucumis denticulata* (Ekman, 1927) (by O'Loughlin, 2002)
Cucumaria godeffroyi Semper, 1868 = *Heterocucumis godeffroyi* (Semper, 1868) (by O'Loughlin, 2002)
Cucumaria liouvillei Vaney, 1914 = *Staurocucumis liouvillei* (Vaney, 1914) (by Ekman, 1927; confirmed by Hansen, 1988)
Cucumaria psolidiformis Vaney, 1908 = *Cucamba psolidiformis* (Vaney, 1908) (this work)
Cucumaria steineni Ludwig, 1898 = *Heterocucumis steineni* (Ludwig, 1898) (by Massin, 1994; O'Loughlin, 2002)
Cucumaria turqueti Vaney, 1906b = *Staurocucumis turqueti* (Vaney, 1906b) (by Ekman, 1927; confirmed by Hansen, 1988; confirmed this work)
Pseudocholochirus mollis Ludwig & Heding, 1935 = *Psolidiella mollis* (Ludwig & Heding, 1935) (by Panning, 1949; confirmed this work)
Psolidium (Cucumaria) coatsi Vaney, 1908 = *Psolicrux coatsi* (Vaney, 1908) (by O'Loughlin, 2002)
Thyone (Thyonidium) lechleri Lampert, 1885 = *Thyone hassleri* Théel, 1886b = *Trachythyone lechleri* (Lampert, 1885) (by Panning, 1949)
Thyone scotiae Vaney, 1906a = *Crucella scotiae* (Vaney, 1906a) (this work)
Thyone turricata Vaney, 1906a = *Paracucumis turricata* (Vaney, 1906a) (by O'Loughlin, 2002)

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